

**UTILITY
PATENT APPLICATION
TRANSMITTAL**

new nonprovisional applications under 37 C.F.R. 1.53(b))

Attorney Docket No.

1482/00057

First Named Inventor or Application Identifier

Jean-Yves Bompay et al

Title

Process for Manufacturing Infrastructures
based on Vittrified Blast-Furnace Slasg and
Additive Used

Express Mail Label No.

APPLICATION ELEMENTS

ADDRESS TO:

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1. ☒ Filing fee as calculated below.
2. ☒ Specification [Total Pages 10]
(preferred arrangement set forth below)
- Descriptive title of the invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to Microfiche Appendix
- Background of the Invention
- Brief Summary of the invention
- Brief Description of the Drawings (if filed)
- Detailed Description
- Claim(s)
- Abstract of the Disclosure
- ☐ Drawing(s) (35 USC 113) [Total Pages]
3. Oath or Declaration [Total Pages x]
- a. ☒ Newly executed (original or copy)
- b. ☐ Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 17 completed)
- ☐ **DELETION OF INVENTOR(S)**
Signed statement attached deleting inventor(s)
named in the prior application, see 37 CFR 1.63(d)(2)
and 1.33(b)
- ☐ Incorporation By Reference (useable if Box 4b is
checked) The entire disclosure of the prior application, from which
a copy of the oath or declaration is supplied under Box 4b, is
considered as being part of the disclosure of the accompanying
application and is hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)
7. ☐ Nucleotide and/or Amino Acid Sequence
Submission (if applicable, all necessary)
- a. ☐ Computer readable copy
- b. ☐ Paper Copy (identical to computer copy)
- c. ☐ Statement Verifying identity of above
copies

8. ☒ Assignment papers (cover sheet & document(s))
9. ☐ 37 CFR 3.73(b) Statement ☐ Power of Attorney
10. ☐ English Translation Document (if applicable)
11. ☒ Information Disclosure ☒ Copies of IDS
Statement (IDS)/PTO-1449 Citations
12. ☒ Preliminary Amendment
13. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
14. ☒ Small Entity ☐ Statement filed in prior application,
Statement(s) Status still proper and desired
15. ☐ Certified copy of Priority Document(s)
(if foreign priority is claimed)
14. ☐ Other:

17. If a **CONTINUING APPLICATION**, check appropriate box and supply the requisite information:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.

18. CORRESPONDENCE ADDRESS

☐ Customer Number or Bar Code Label

(Insert Customer No. or Attach bar code
label here)

or x correspondence address below

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Fee Calculation and Transmittal

(Col 1)			(Col 2)	(Col 3)	SMALL ENTITY		OR	NON-SMALL ENTITY	
NO. FILED			NO. EXTRA	RATE	FEE	RATE		FEE	
TOTAL	20	minus	20	= 0	x9=	\$		x18=	\$
INDEP	1	minus	3	= 1	x39=	\$		x78=	\$
_ First Presentation, Multiple Dependent Claims					+130=	\$		+260=	\$
Base Filing Fee						\$345			\$690
Other Fee (specify purpose) <u>Assignment recordal</u>						\$ 40			\$
TOTAL FILING FEE* (accounting for possible small entity status)						\$ 385	OR	TOTAL	\$

- ☒ A check in the amount of \$ 385 to cover the filing fee is enclosed
- ☐ No payment is enclosed at this time. Full payment will be made when the executed Declaration is submitted.
- ☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. **22-0185** as described below. A duplicate copy of this sheet is enclosed.
- ☐ Charge the amount of \$__ as filing fee
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Name (Print/Type)	Burton A. Amernick	Registration No. (Attorney/Agent)	24,852
Signature			Date March 27, 2000

Applicant or Patentee:

Serial No. or Patent No.: _____ Attorney Docket: _____

Filed or Issued: _____

For: PROCESS FOR MANUFACTURING INFRASTRUCTURES BASED ON VITRIFIED BLAST-FURNACE
SLAG AND ADDITIVE USED.

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) and 1.27(c)) - SMALL BUSINESS CONCERN

I hereby declare that I am

- ☒ the owner of the small business concern identified below:
☐ an official of the small business concern empowered to act
on behalf of the concern identified below:

NAME OF CONCERN MECAROUTE
ADDRESS OF CONCERN 68, avenue des Guillaumes, 92000 NANTERRE, FRANCE

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled _____

by inventor(s) BOMPAY Jean-Yves
PRUNEVIETILLE Jean-Michel
described in _____

- ☐ the specification filed herewith
☐ Application Serial No. _____, filed _____
☐ Patent No. _____, issued _____

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

NAME MECAROUTE
ADDRESS 68, avenue des Guillaumes, 92000 NANTERRE, FRANCE
☐ INDIVIDUAL ☒ SMALL BUSINESS ☐ NONPROFIT ORGANIZATION
CONCERN

NAME _____
ADDRESS _____
☐ INDIVIDUAL ☐ SMALL BUSINESS ☐ NONPROFIT ORGANIZATION
CONCERN

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, or any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING PRUNEVIETILLE Jean-Michel
TITLE OF PERSON OTHER THAN OWNER DIRECTOR
ADDRESS OF PERSON SIGNING 11, rue de Suresnes, 92420 VAUCRESSON, FRANCE

SIGNATURE _____

DATE March 22, 2000

Claim 11, line 2, delete "10" and insert ---Claim 9---.

Claim 13, line 1, delete "one of Claims 9 to 12" and insert ---Claim 9---.

Claim 14, line 1, delete "one of Claims 9 to 13" and insert ---Claim 9---.

Please add the following new claims.

16. Process according to Claim 2, wherein the dry ground slag has a water content of less than 0.5% by weight.

17. Process according to Claim 2, wherein the activator consists, for more than 95% by weight, of lime, calcium sulphate or a mixture of lime and calcium sulphate.

18. Process according to Claim 3, wherein the activator consists, for more than 95% by weight, of lime, calcium sulphate or a mixture of lime and calcium sulphate.

19. Process according to Claim 5, wherein the activator has an average particle size of between 0 and 500 μm for at least 95% of its weight and a moisture content of less than 0.5% by weight.

20. Process according to Claim 2, wherein more than 95% by weight of the additive consists of a mixture having the following formulation by weight:

- | | | |
|---|---------------------------|-----------|
| - | calcium sulphate | 25 to 45% |
| - | lime | 2 to 6% |
| - | dry ground vitrified slag | qsp 100%. |

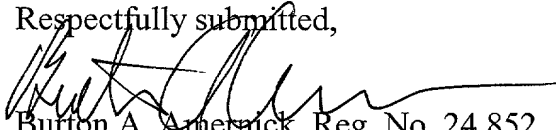
Remarks

The claims have been amended to eliminate multiple dependency and to improve their format. None of these amendments is believed to involve any new matter.

Accordingly, it is respectfully requested that the foregoing amendments be entered, that

the application as so amended receive an examination on the merits, and that the claims as now presented receive an early allowance.

Respectfully submitted,



Burton A. Amernick, Reg. No. 24,852

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Telephone (202) 331-7111

Date:

UNITED STATES PATENT AND TRADEMARK OFFICE

I, Roger Walter GRAY MA, DPhil, CPhys,
translator to RWS Group plc, of Europa House, Marsham Way, Gerrards Cross,
Buckinghamshire, England declare;

1. That I am a citizen of the United Kingdom of Great Britain and Northern Ireland.
2. That I am well acquainted with the French and English languages.
3. That the attached is, to the best of my knowledge and belief, a true translation into the English language of the specification in French filed with the application for a patent in the U.S.A. on
under the number
4. That I believe that all statements made herein of my own knowledge are true and that all statements made on information and belief are true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the patent application in the United States of America or any patent issuing thereon.



For and on behalf of RWS Group plc

The 20th day of March 2000

**PROCESS FOR MANUFACTURING INFRASTRUCTURES BASED ON
VITRIFIED BLAST-FURNACE SLAG AND ADDITIVE USED**

The present invention relates to the construction of road and motorway infrastructures, such as base courses and foundation courses of roads, or of civil engineering infrastructures, such as rafts for building foundations, for airport parking or storage areas, for railway platforms or for port quays or wharfs. Generically, this collection of uses will be referred to hereafter by the term "infrastructures".

It is well known in the manufacture of these infrastructures to use mixes of aggregates, of a hydraulic binder, comprising a slag and an activator, and of water (the gravel-slag or sand-slag technique). Next, the mix is spread out over the surface to be treated and is compacted according to particular specifications.

The aggregates consist, in a known manner, of grit or sand, for example, coming from quarries.

The slag used is a by-product of the manufacture of pig iron in blast furnaces and is consequently inexpensive. It is essentially composed of three oxides, namely CaO , SiO_2 and Al_2O_3 , which may be in the form of oxides, silicates, aluminates or aluminosilicates. On leaving the blast furnace, the slag is vitrified and made into particulate form, essentially using two methods. According to the first method, the slag leaving the blast furnace at 1500°C is sent, in the form of a fluid stream, into a tank whose walls include water jets; the slag forms particles having surface asperities: it is called "granulated" slag. The particles of granulated slag have dimensions of less than 5 mm, their average size generally being about 0.5 mm; the granulated slag contains approximately 1% of fines having a particle size of less than 80 micrometers. According to a second method, the slag is cooled by mechanically and hydraulically spraying it at high speed into the air; the particles

are in the form of nodules having a spheroidal shape and a foam structure; it is called "pelletized" slag. The particles of pelletized slag have a particle size of less than 80 mm, 95% of particles generally having average sizes of less than 20 mm; the pelletized slag contains virtually no fines.

The granulated or pelletized slag is generally used in preground form. By pregrinding, the particle size of the entire product is reduced and the proportion of fines of less than 80 μ m is increased.

It is also known to add an activator in pulverulent form to the slag. The activation of the vitrified blast-furnace slag consists, firstly, in the presence of water, in attacking the slag with a basic agent, the purpose of which is to dissolve a small amount of slag. Thus, by successive crystallization from the aqueous phase, solid hydrated compounds are formed, which results in the mix setting and hardening. The activator is defined in French Standard NF P 98-107; it may consist of lime, calcium sulphate or both these, it may also contain soda or potash, silica and also a product having, in addition, hydraulic binder properties.

The mix of aggregates, slag, activator and water must principally have the following properties.

Firstly, the mix must not set immediately, so as to be able to be spread out over the ground. It is desirable to have a workability time at least greater than 12 hours, generally between 15 and 30 hours. When the mix is spread out over the ground, it is compacted using a specified process and to a specified value. Setting then starts and may last 4 to 5 years, the mix after compacting nevertheless being already sufficiently load-bearing in order for it to be possible, in particular, to drive over it immediately.

Secondly, the compacted mix must comply with mechanical performance standards. The mechanical performance characteristics taken into account are the 360-day tensile strength (Rt) and the 360-day elastic

modulus (E), the values of which are estimated from test pieces manufactured in the laboratory. It has been found that the 360-day mechanical performance characteristics depended on the particle size of the granulated or pelletized slag and that it was favourable to use a preground slag, the particles of which are smaller than 2 mm and contain approximately 10% of fines.

However, the storage properties of the slag depend on the composition of the latter. This is because, when an iron ore coming from mines in Lorraine (minette ore) is used in blast furnaces and worked according to the Thomas process, a stable and storable preground slag is obtained and it is possible to achieve 360-day mechanical performance characteristics according to the standards, even after the preground slag has been stored. However, when the slag comes from the treatment of another ore, for example, haematite, the preground slag very often does not comply with the mechanical performance standards; this is because it has been found that, during storage, the proportion of fines decreases in a random fashion during storage; it may thus go from 10 to 4% in a few hours.

Now, it seems that the fines content of the slag used is an essential datum for achieving the required performance characteristics of the mix. The object of the invention is therefore to guarantee a sufficient content of fines in the slag at the time of mixing in the mixer and to obtain workable mixes which meet the 360-day performance standards.

The subject of the invention is therefore a process for constructing infrastructures, especially civil engineering infrastructures or road infrastructures, in which aggregates, vitrified blast-furnace slag, a pulverulent activator and water are mixed together, and the mix is spread out over the ground, compacted and left to harden, characterized in that a particulate slag and a ready-prepared additive containing, on the one hand, the activator and, on the

other hand, dry ground vitrified slag having a particle size of less than 500 μm are added to the aggregates. Preferably, the particulate slag added to the aggregates is an as-granulated or as-pelletized slag which is not preground.

The ground vitrified slag is obtained by passing a granulated or pelletized slag through a suitable mill, for example a ball mill; the slag is preferably dried during the grinding until its water content is less than 0.5% by weight. The ground slag has a particle size of less than 500 μm , preferably less than 100 μm , for at least 80% by weight.

The activator may be any known activator. However, it is preferred to use an activator consisting, for more than 95% by weight, of lime or of calcium sulphate or, more particularly preferably, of a mixture of lime and calcium sulphate; the activator may optionally contain small amounts of soda or potash. Advantageously, the activator has an average particle size of between 0 and 500 μm for at least 95% of its weight and a moisture content of less than 0.5% by weight.

For more than 95% by weight, the additive preferably consists of a mixture having the following formulation by weight:

- calcium sulphate	25 to 45 %
- lime	2 to 6 %
- dry ground vitrified slag	qsp 100 %.

Further known formulation adjuvants for this type of mix (aggregates/slag/activator/water) may be introduced into the additive, such as a deflocculant, a setting accelerator or retarder, or steelworks scoria.

The amount of additive added is generally between 1 and 3% by weight with respect to the weight of the mix (aggregate/slag/additive/water); in this way, approximately 0.5 to 2.0% by weight of slag fines having a particle size of less than 80 μm are introduced into the mix.

The vitrified blast-furnace slag, which is added to the aggregates in the unpreground particulate state, may, according to the invention, be an as-granulated slag, which generally contains at most approximately 1% fines, or an as-pelletized slag, which contains substantially no fines. Using an unpreground slag avoids having to grind all of the slag, something which constitutes a first advantage over the prior art. Furthermore, it is completely unnecessary to dry all of the slag in order to avoid the reduction in the amounts of fines since the necessary fines are provided by the additive, so that the only fraction of slag to be dried is the ground slag which forms a constituent of the additive. However, it is possible to use a preground slag instead of the as-produced particulate slag, accepting that the abovementioned first advantage would be lost, and, in this case, it is of little matter whether the fines of the preground slag remain during storage or not, since a sufficient and controlled amount of slag fines is provided by the additive.

The subject of the present invention is also the additive for the construction of infrastructures according to the above process, characterized in that it includes, on the one hand, a pulverulent activator and, on the other hand, dry ground vitrified slag having a particle size of less than 500 μm .

Preferably, the dry ground slag has a water content of less than 0.5% by weight.

Advantageously, the activator consists, for more than 95% by weight, of lime, calcium sulphate or a mixture of lime and calcium sulphate; it may furthermore contain sodium or potassium hydroxide.

Preferably, the activator has an average particle size of between 0 and 500 μm and a moisture content of less than 0.5% by weight.

Preferably, more than 95% by weight of the additive consists of a mixture having the following formulation by weight:

- calcium sulphate 25 to 45 %
- lime 2 to 6 %
- dry ground vitrified slag qsp 100 %.

The additive may also contain known formulation
5 adjuvants for slag-based mixes in order to produce infrastructures.

The illustrative and non-limiting example given below will allow the invention to be more clearly understood.

10 EXAMPLE:

The additive used has the following formulation by weight:

- 36% calcium sulphate;
- 4% lime;
- 15 - 60% ground vitrified slag having a particle size of less than 100 μ m with a water content of 0.5% by weight.

In order to construct a road infrastructure, a mix having the following formulation is produced:

- 20 - 45% Seine (Anneville) fine siliceous-limestone gravel (5 mm/20 mm) (IC 60);
- 45.5% of a Beauce (Baignolet) limestone sand (less than 6 mm) (IC 100);
- 8% of an as-granulated slag produced from haematite as iron ore (from Dunkerque) having
25 an activity coefficient of 23 according to the NF P 98-108 standard;
- 1.5% of the additive defined above.

The various constituents of the mix are mixed
30 with water so as to obtain a mix having 8.7% water and the mix is spread. Next, it is compacted until an PMO density of 2.08 is obtained (PMO = "procto-modified optimum").

The mechanical performance characteristics of
35 the compacted mix are measured as indicated below:

a) Post-setting strength:

Tensile strength tests were carried out on vibro-compression test pieces having the dimensions 16 x 32 cm with the "Procto-modified optimum" (PMO)

parameters according to the NF P 98-114 standard at 90 days and at 360 days. The results are as follows:

	90-day tensile strength (Rt)	0.73 MPa
	360-day Rt	0.81 MPa
5	90-day elastic modulus E	14,880 MPa
	360-day E	16,980 MPa

According to the NF P 98-118 standard, the mix is therefore classified as G2.

b) Workability time:

10 The test consists in measuring the speed of propagation of a wave through the material treated. The more it has hardened, the slower the speed.

The workability time is the time that elapses between an instant T_0 just after mixing, when the speed of propagation of the wave is v_0 , and the instant when the speed is no more than 60% of v_0 .

15 At a temperature of 20°C, a workability time of 15 hours 30 minutes was obtained.

CLAIMS

1. Process for constructing infrastructures, in which aggregates, vitrified blast-furnace slag, a
5 pulverulent activator and water are mixed together, and the mix is spread out over the ground, compacted and left to harden, characterized in that a particulate slag and a ready-prepared additive containing, on the one hand, the activator and, on the other hand, dry
10 ground vitrified slag having a particle size of less than 500 μm are added to the aggregates.
2. Process according to Claim 1, characterized in that an unpreground as-granulated or as-pelletized slag is used as the particulate slag added to the
15 aggregates.
3. Process according to either of Claims 1 and 2, characterized in that the dry ground slag has a water content of less than 0.5% by weight.
4. Process according to one of Claims 1 to 3,
20 characterized in that the activator consists, for more than 95% by weight, of lime, calcium sulphate or a mixture of lime and calcium sulphate.
5. Process according to Claim 4, characterized in that the activator contains sodium or potassium
25 hydroxide.
6. Process according to either of Claims 4 and 5, characterized in that the activator has an average particle size of between 0 and 500 μm for at least 95% of its weight and a moisture content of less than 0.5%
30 by weight.
7. Process according to one of Claims 1 to 6, characterized in that more than 95% by weight of the additive consists of a mixture having the following formulation by weight:
35
 - calcium sulphate 25 to 45 %
 - lime 2 to 6 %
 - dry ground vitrified slag qsp 100 %.
8. Process according to one of Claims 1 to 7, characterized in that an amount of additive of between

1 and 3% by weight with respect to the total of the mix (aggregates/slag/additive/water) is added to the said mix.

5 9. Additive for the construction of infrastructures according to the process of one of Claims 1 to 7, characterized in that it includes, on the one hand, a pulverulent activator and, on the other hand, dry ground vitrified slag having a particle size of less than 500 μm .

10 10. Additive according to Claim 9, characterized in that the dry ground slag has a water content of less than 0.5% by weight.

15 11. Additive according to either of Claims 9 and 10, characterized in that the activator consists, for more than 95% by weight, of lime, calcium sulphate or a mixture of lime and calcium sulphate.

12. Additive according to Claim 11, characterized in that the activator contains soda or potash.

20 13. Additive according to one of Claims 9 to 12, characterized in that the activator has an average particle size of between 0 and 500 μm and a moisture content of less than 0.5% by weight.

25 14. Additive according to one of Claims 9 to 13, characterized in that more than 95% by weight of the additive consists of a mixture having the following formulation by weight:

- calcium sulphate	25 to 45 %
- lime	2 to 6 %
- dry ground vitrified slag	qsp 100 %.

30 15. Additive according to Claim 14, characterized in that it contains known formulation adjuvants for slag-based mixes in order to produce infrastructures.

ABSTRACT

PROCESS FOR MANUFACTURING INFRASTRUCTURES BASED ON VITRIFIED BLAST-FURNACE SLAG AND ADDITIVE USED

The invention relates to a process for constructing infrastructures, in which aggregates, vitrified blast-furnace slag, a pulverulent activator and water are mixed together, the mix is spread out over the ground, compacted and left to harden, and in which a particulate slag and a ready-prepared additive containing, on the one hand, the activator and, on the other hand, dry ground vitrified slag having a particle size of less than 500 μm are added to the aggregates.

The invention also relates to the additive for the construction of infrastructures according to the said process, which additive includes, on the one hand, a pulverulent activator and, on the other hand, dry ground vitrified slag having a particle size of less than 500 μm .

DECLARATION AND POWER OF ATTORNEY

U.S.A.

As a below-named inventor, I hereby declare: My residence, post office address and citizenship are as stated below next to my name. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled PROCESS FOR MANUFACTURING INFRASTRUCTURES BASED ON VITRIFIED BLAST-FURNACE SLAG AND ADDITIVE, the specification of which USED.

(check ☐ is attached hereto.
one)

☐ was filed on _____ as Application Serial No. _____
and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above, and acknowledge a duty to disclose information which is material to the examination of this application under 37 CFR 1.56(a). I hereby claim priority benefits under 35 U.S.C. 119 based on any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate on the present invention, filed before the application(s) on which priority is claimed.

FOREIGN APPLICATION(S), IF ANY, REFERRED TO ABOVE			
COUNTRY	APPLICATION NUMBER	DATE	PRIORITY CLAIMED
FRANCE	98 04457	09.04.98	YES _____ NO <u>X</u>
			YES _____ NO _____
			YES _____ NO _____

I hereby claim benefit under 35 U.S.C. 120 of any U.S. application(s) listed below. If the subject matter of any claim(s) of this application is not disclosed in the prior U.S. application(s) as required by paragraph one of 35 U.S.C. 112. I acknowledge a duty to disclose material information as defined in 37 CFR 1.56(a) regarding occurrences between the filing date of the prior application(s) and the national or PCT international filing date of this application:

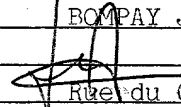
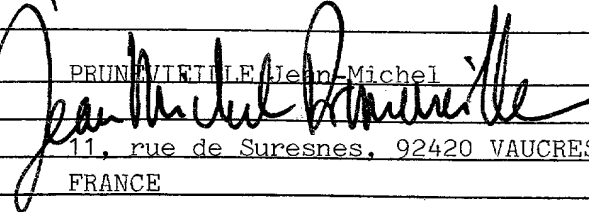
APPLICATION SERIAL NUMBER	DATE	STATUS

I hereby appoint Elliott I. Pollock, RN (Registration No. 16,906; George Vande Sande, RN 17,276; Robert R. Priddy, RN 20,169; Burton A. Amernick, RN 24,852; Stanley B. Green, RN 24,351; Richard Wiener, RN 18,741; Townsend M. Belser, Jr., RN 22,956; Morris Liss, RN 24,210; Martin Abramson, RN 25,787; George Pettit, RN 27,369; Dean E. Carlson, RN 18,537; Louis Woo, RN 31,730; and Elzbieta Chlopecka, RN 32,767, my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

Address all communications to **POLLOCK, VANDE SANDE & PRIDDY, P.O. Box 19088, Washington, D.C. 20036.**

All statements made herein of my own knowledge are true. All statements made on information and belief are believed to be true. These statements were made with the knowledge that willful false statements and the like so made are punishable by fine, imprisonment, or both, under 18 U.S.C. 1001 and may jeopardize the validity of the application or any patent issuing thereon.

Note: Please sign one full given name and your surname, using initials where appropriate for other names. It is important that the name be consistent throughout the application papers. Signing of an application more than five weeks prior to filing or an undated application is not acceptable to the Patent and Trademark Office except for receiving an initial filing date.

- Full name of inventor BOMPAY Jean-Yves Date: 03/22/2000
 Inventor's signature 
 Residence Rue du Chapitre, 60800 FESNOY-LE-LUAT, FRANCE
 Citizenship FRENCH
 Post Office Address _____
- Full name of inventor PRUNIERE Jean-Michel Date: 03/22/2000
 Inventor's signature 
 Residence 11, rue de Suresnes, 92420 VAUCRESSON, FRANCE
 Citizenship FRANCE
 Post Office Address _____

☐ See additional page for additional inventors, if checked.